SOME ENVIRONMENTAL CONSIDERATIONS IN DEVELOPMENT OF INDIANA HIGHWAYS

(Part I)

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[Editor's note. Following are three related papers written by three environmental specialists of the ISHC on the theme of "Environmental Considerations In Indiana Highway Development."]

INTRODUCTION

Each of the environmental concerns highlighted here and in the following two papers must be considered at every stage in the development of a highway project. But emphasis placed on specific environmental considerations may be somewhat different at various stages of project development. There should, however, be continuity in environmental considerations throughout the life of the project.

In the planning division, we're concerned with the location of one or more corridors to fulfill a transportation demand. We're therefore generally evaluating a large area and using uncontrolled data. A project must be evaluated in terms of the physical, social, and economic environment. Early identification of as many environmental variables as possible will aid in the selection of a corridor which minimizes the overall impact to the area. Trade-offs are necessary as the project progresses because one or more of the environmental variables may conflict with each other and/or good highway design. But, at each step along the way, attempts are made to minimize adverse impacts; and, where appropriate, plans are made for mitigation measures.

Location considerations generally fall into two categories: "direct or primary" and "indirect or secondary." Direct considerations are self-explanatory. Information is collected on the physical environment such as: terrain, geology, and soil characteristics. Demographic information

is also assembled, such as census and economic data to construct a socio-economic profile of the project area.

Secondary location considerations are a little more abstract. These involve the implications of highway location on land use planning. I will focus more on this aspect of environmental consideration since it relates directly to the planning process. The state is divided into 20 regional planning areas. Within these regions are also numerous smaller planning agencies. State highway planning projects are coordinated with these planning agencies. Each alternative is analyzed as to its effects on local plans and policies to determine areas of conflict and agreement.

PRIME AGRICULTURAL IMPACTS

A very important aspect of land use planning involves the adverse impacts of a transportation improvement to prime agricultural land. The direct impacts include: taking of farmland for right-of-way, segmentation of farming operations, and the creation of irregularly shaped parcels which are difficult to cultivate.

Indirect or secondary impacts may alter regional accessibility and cause a change in land use. A change in regional accessibility may reduce transportation time and cost and may open new markets for the farmer. On the other hand, if some of the local roads are closed for an access-controlled facility, the farmer may be inconvenienced due to adverse travel distance.

A change in land use may be more important long-term when considering prime agricultural impacts. Development induced at interchange points, and the change in accessibility may result in further conversion of prime agricultural land to another use. Factors that make good farmland also make the land attractive for development. To access this potential secondary impact we address the following items:

1. Profitability of farming in the region—If farming is very profitable, purchase offers are less attractive.
2. Taxing policies—What are the regional assessment practices? Is the land assessed at current use or potential use? Residential or business rates may be too high for the farmer.
3. Location of the agricultural area relative to transportation routes —The potential significance of secondary impact differs considerability if the farmland is located on an urban fringe area as opposed to a pristine rural environment.
4. Availability of non-farm land suitable for development—If such land is available, development pressure on farmland will be reduced.

5. Local policy—What are the zoning codes, and is there enforcement?

HIGHWAY NOISE IMPACTS

Operation of a transportation improvement can result in adverse levels of noise. Effective control of the undesirable effects of highway generated noise requires a three part approach:

1. Source emission reduction
2. Improved highway design
3. Land use control

The first two components are currently being addressed by private industry and federal and state agencies. The third area is traditionally an area of local governmental responsibility.

Source emission reduction requires the development of quieter cars and trucks. Significant progress is being made in research to reduce vehicle engine and exhaust noise, but tire design, the major source of high speed traffic noise, may place limits on further improvements.

Improved highway design means a greater attention to noise impacts in choosing the location and design of new highways. The FHWA has established standards and maintain the position that highway agencies have the responsibility for taking measures that are prudent and feasible to assure that the location and design of highways are compatible with existing land use. Assessment of an improvement's effect on noise levels first requires an estimate of traffic volumes to use the new facility. This is done at the planning phase. Project specific noise studies are addressed in the following paper.

Local governments, on the other hand, have responsibility for land development control and zoning. Thus, land use control will continue to be a crucial component of the three part approach to noise control. Local government will continue to have the responsibility for discouraging the development of noise sensitive land uses (such as homes and schools) in highway noise impacted areas or for ensuring that any such development that does occur is planned to minimize the adverse effects of noise. Planning techniques for minimizing noise impacts to sensitive land uses include placement of buffer zones between the highway and the sensitive land use.

AIR QUALITY IMPACTS

An area of particular concern in defining impacts on air quality is the set of federal standards and procedures, to maintain air quality. These procedures require each state to draft an "Implementation Plan"

which will assure attainment of the standards. Control of air pollution at its source is the primary responsibility of state and local governments. Failure to consider the law's requirements could subject an area to automatic penalties including a cutoff of certain federal highway funds, construction grants, or prohibition on construction of new stationary sources of pollution, thus virtually halting economic growth. Careful planning will be necessary for transportation and industrial development in order to make both economic growth and clean air possible.

Acceptable levels of air quality have been defined in the Clean Air Act. These levels are pollutant specific. These standards were to have been achieved nationwide by 1975. Some areas have been designated as non-attainment areas. Non-attainment means that air in that area is still more polluted than is acceptable to insure protection of health and property. Indiana has the fewest number of counties designated as non-attainment within the EPA Region V.

The Clean Air Act stipulates that each non-attainment county must have its emission inventory updated each year. Many of you may be involved in preparing control strategies.

Highway projects must be compatible with the maintenance of any ambient air quality standards. The principle transportation-related source of pollutants degrading air quality is the gaseous emissions of motor vehicles. These include carbon-monoxide (CO), unburned hydro-carbons (HC), oxides of nitrogen (NOx), and oxides of sulfur (SOx). Particulate emissions are also associated with the operation of motor vehicles and construction phase.

Photochemical oxidants (smog). Smog is, by far, the most serious air pollution problem of urban America. It is formed by the interaction of oxides of nitrogen and hydrocarbons in the presense of sunlight. A new target date of December 31, 1982 has been established for clean-up of these pollutants. For CO and photochemical oxidants, the date may be extended to December 31, 1987 if a state can show that it will not be able to meet the standards by 1982 despite reasonable control measures. The state implementation plan describing the control procedures must be approved by the EPA by July 1, 1979.

Vehicle, roadway, and land-use regulatory measures can all be used to improve air quality.

Vehicle-related measures are the most direct means of reducing emissions. Emission control devices such as the catalytic converter reduce emissions.

Location and design of roadway and the effect on traffic flow are important factors in mixing and dispersing of air pollutants. Assess-

ment of an improvement's effect on air quality first requires an estimate of anticipated traffic volumes on the facility. This is done at the planning phase. The question must be asked—are any of the air quality standards or criteria of the state implementation plan exceeded as a result of this ADT? Project specific analysis is discussed in the following paper.

The 1977 Amendments to the Clean Air Act set forth 18 transportation control measures to serve as guidelines for transportation control planning. Some of the measures include:

1. Motor vehicle emission inspection and maintenance programs
2. Improved public transit
3. Establish bus and carpool lanes
4. Staggered work hours
5. Improvement in traffic flow

Emissions Offset Policy

When, in the mid-1970's, it became clear that the original 1975 deadline for cleaning up dirty air was not going to be met, EPA's response was national "Emission Offset" policy that went into effect in late 1976.

Under this policy, new polluting industry could be constructed only if the owner of the proposed new source of pollution could guarantee reductions in emissions from the existing sources in the area that more than equalled the emissions from the new facility. This sometimes involves an offer to pay for cleaning up emissions of other private or public facilities existing there.

The EPA emission offset rules will remain in effect until the revised SIP's are approved by July 1, 1979 and go into effect.

SOCIAL IMPACTS

Displacement of People

Right-of-way required for many transportation improvements can result in the displacement of people. This can have both social and economic consequences for an area. To assess these consequences, these key questions are asked:

1. What is the probable magnitude of displacement of each proposed alternative?
2. Based on socio-economic characteristics of those displaced, can special relocation problems or needs be anticipated? (in terms of age, income, Title VI—minorities, etc.)

3. Is replacement housing matching the needs and income of displaced households currently available in either the same or nearby neighborhoods?
4. If adequate replacement housing is currently not available, are housing sites and money available to construct replacement housing?

Community Cohesion

A transportation improvement may intersect or form a boundary for a community, thereby possibly affecting the stability and cohesion of the community. In assessing this impact, it is first necessary to identify communities and their boundaries and identify which groups would be affected (ethnic, age, income, etc). Key questions: 1. Will the proposed improvement intersect or bypass these communities? 2. Will the improvement affect the stability of a community by displacing or disrupting important segments of the residential or business community, or by isolating segments of a community? 3. Will the construction process itself affect community due to vehicular and pedestrian detours?

Accessibility of Facilities and Services

Facilities and services include: educational and health facilities, employment, commercial and institutional centers, recreational and cultural facilities, as well as public utilities and emergency services (police, fire, etc). A transportation improvement may modify accessibility to these facilities and services at either a local or regional scale.

Four key variables are considered and related to the location and design of the transportation improvement alternatives under study:

1. Who? Will the travel patterns of a total area population, individual socio-economic groups, or a geographic sub-area or zone be affected?
2. Why? Will travel to employment, shopping, recreation, institutional or cultural activities be affected?
3. How? Will travel by automobiles, transit, or pedestrians/cyclists be affected?
4. When? Will travel during peak hour or off-peak hours be affected?

Will regional access to facilities in the study area be enhanced or hindered?

Will access to public services, such as police and fire protection be reduced in any part of the study area?

ECONOMIC IMPACTS

A transportation improvement can influence business activity in an area by affecting levels of employment and income either positively or negatively. The influence of a transportation improvement on business activity can result from displacement and conversion of land to transportation use (we've discussed implications to agricultural land); there can be a loss of tax revenue (therefore affecting the tax base); or conversely, there can be economic stimulus due to actual construction activity; and changes in accessibility of the project area may alter the economic climate.